Outcome Measurement

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This presentation draws on Redefining Health Care: Creating Value-Based Competition on Results (with Elizabeth O. Teisberg), Harvard Business School Press, May 2006; “A Strategy for Health Care Reform—Toward a Value-Based System,” New England Journal of Medicine, June 3, 2009; “Value-Based Health Care Delivery,” Annals of Surgery 248: 4, October 2008; “Defining and Introducing Value in Healthcare,” Institute of Medicine Annual Meeting, 2007. Additional information about these ideas, as well as case studies, can be found the Institute for Strategy & Competitiveness Redefining Health Care website at http://www.hbs.edu/rhc/index.html. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means — electronic, mechanical, photocopying, recording, or otherwise — without the permission of Michael E. Porter and Elizabeth O. Teisberg.
Creating a Value-Based Health Care Delivery System

The Strategic Agenda

1. Organize Care into Integrated Practice Units (IPUs) around Patient Medical Conditions
   - For primary and preventive care, organize to serve distinct patient segments

2. Measure Outcomes and Costs for Every Patient

3. Move to Bundled Payments for Care Cycles

4. Integrate Care Delivery Systems

5. Expand Geographic Reach and Serve Populations

6. Build an Enabling Information Technology Platform
Agenda

• Principles of Outcome Measurement
• Putting Outcomes Measurement into Practice
The Measurement Landscape

- **Patient Initial Conditions**
  - E.g. Staff certification, facilities standards

- **Processes**
  - Protocols/ Guidelines

- **Patient Experience/Engagement**

- **Indicators**
  - E.g. PSA, Gleason score, surgical margin

- **Structure**

- **(Health) Outcomes**
Process Measurement is Not Enough
Overall survival time (95% CI) free of signals for updating.

Principles of Outcome Measurement

1. Outcomes should be measured by medical condition or primary care patient segment
   - Not by procedure or intervention
Principles of Outcome Measurement

1. Outcomes should be measured by **medical condition** or **primary care patient segment**
   - **Not** by **procedure** or **intervention**

2. Outcomes should reflect the **full cycle of care** for the condition
# The Care Delivery Value Chain

## Acute Knee-Osteoarthritis Requiring Replacement

<table>
<thead>
<tr>
<th>INFORMING AND ENGAGING</th>
<th>DIAGNOSING</th>
<th>PREPARING</th>
<th>INTERVENCING</th>
<th>RECOVERING/REHABBING</th>
<th>MONITORING/MANAGING</th>
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<tbody>
<tr>
<td><strong>Care Delivery</strong></td>
<td><strong>MONITOR</strong></td>
<td><strong>PREVENT</strong></td>
<td><strong>INTERVENING</strong></td>
<td><strong>RECOVERING/REHABBING</strong></td>
<td><strong>MANAGE</strong></td>
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<tr>
<td>• Importance of exercise, weight reduction, proper nutrition</td>
<td>• Meaning of diagnosis</td>
<td>• Setting expectations</td>
<td>• Expectations for recovery</td>
<td>• Importance of exercise, maintaining healthy weight</td>
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<tr>
<td>• Prognosis (short- and long-term outcomes)</td>
<td>• Baseline health status</td>
<td>• Blood loss</td>
<td>• Infections</td>
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<td>• Drawbacks and benefits of surgery</td>
<td>• Joint-specific symptoms and function</td>
<td>• Complications</td>
<td>• Joint-specific symptoms and function</td>
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<td></td>
<td>• Change in subchondral bone</td>
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<td>• Inpatient length of stay</td>
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<td></td>
<td>• Overall health</td>
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<td>• Ability to return to normal activities</td>
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<td><strong>MEASURING</strong></td>
<td><strong>ACCESSING</strong></td>
<td><strong>MONITORING/PREVENTING</strong></td>
<td><strong>DIAGNOSING</strong></td>
<td><strong>PREPARING</strong></td>
<td><strong>INTERVENING</strong></td>
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<td>• PCP office</td>
<td>• Specialty office</td>
<td>• Imaging facility</td>
<td>• Pre-op evaluation center</td>
<td>• Operating room</td>
<td>• Nursing facility</td>
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<td>• Health club</td>
<td>• Primary care office</td>
<td>• Physical therapy clinic</td>
<td>• Specialty office</td>
<td>• Recovery room</td>
<td>• Rehab facility</td>
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<td></td>
<td>• Orthopedic floor at hospital or specialty surgery center</td>
<td>• PT clinic</td>
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<tr>
<td><strong>MONITOR</strong></td>
<td><strong>PREVENT</strong></td>
<td><strong>INTERVENING</strong></td>
<td><strong>RECOVERING/REHABBING</strong></td>
<td><strong>MANAGE</strong></td>
<td></td>
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<tr>
<td>• Conduct PCP exam</td>
<td>• Prescribe anti-inflammatory medicines</td>
<td>• Administer anesthesia (general, epidural, or regional)</td>
<td>• Immediate return to OR for manipulation, if necessary</td>
<td>• Consult regularly with patient</td>
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<tr>
<td>• Refer to specialists, if necessary</td>
<td>• Recommend exercise regimen</td>
<td>• Determine approach (e.g., minimally invasive)</td>
<td>• Monitor coagulation</td>
<td>• Prescribe prophylactic antibiotics when needed</td>
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<tr>
<td><strong>PREVENT</strong></td>
<td><strong>INTERVENING</strong></td>
<td><strong>RECOVERING/REHABBING</strong></td>
<td><strong>MANAGE</strong></td>
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<tr>
<td>• Review history and imaging</td>
<td>• Perform and evaluate MRI and x-ray</td>
<td>• Run blood labs</td>
<td>• Monitor coagulation</td>
<td>• Set long-term exercise plan</td>
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<tr>
<td>• Perform physical exam</td>
<td>• Assess cartilage loss</td>
<td>• Run blood labs</td>
<td>• Track risk indicators (fever, swelling, other)</td>
<td>• Revise joint, if necessary</td>
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</tr>
<tr>
<td>• Recommend treatment plan (surgery or other options)</td>
<td>• Assess bone alterations</td>
<td>• Run blood labs</td>
<td>• Physical therapy</td>
<td>• Orthopedic Specialist</td>
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</tbody>
</table>

## CARE DELIVERY

- **IMAGING**
  - Perform and evaluate MRI and x-ray
    - Assess cartilage loss
    - Assess bone alterations

- **CLINICAL EVALUATION**
  - Review history and imaging
  - Perform physical exam
  - Recommend treatment plan (surgery or other options)

- **OVERALL PREP**
  - Conduct home assessment
  - Monitor weight loss

- **SURGICAL PREP**
  - Perform cardiology, pulmonary evaluations
  - Run blood labs
  - Conduct pre-op physical exam

- **PAIN MANAGEMENT**
  - Prescribe preemptive multimodal pain meds

- **ANESTHESIA**
  - Administer anesthesia (general, epidural, or regional)

- **SURGICAL PROCEDURE**
  - Monitor coagulation
  - Provide daily living support (showering, dressing)
  - Track risk indicators (fever, swelling, other)

- **PHYSICAL THERAPY**
  - Daily or twice daily PT sessions
Measuring Long-Term Outcomes
Hip Replacement

- Measurement often stops 30 days, 90 days, or one year post-intervention, but many critical outcomes that matter to patients are revealed over longer time periods.

Principles of Outcome Measurement

1. Outcomes should be measured by medical condition or primary care patient segment
   - Not by procedure or intervention

2. Outcomes should reflect the full cycle of care for the condition

3. Outcomes are always multi-dimensional, and should include the health results most relevant to patients
The Outcome Measures Hierarchy

Tier 1
Health Status
Achieved or Retained

Survival

Degree of health/recovery

Tier 2
Process of Recovery

Time to recovery and return to normal activities

Disutility of the care or treatment process (e.g., diagnostic errors and ineffective care, treatment-related discomfort, complications, or adverse effects, treatment errors and their consequences in terms of additional treatment)

Tier 3
Sustainability of Health

Sustainability of health/recovery and nature of recurrences

Long-term consequences of therapy (e.g., care-induced illnesses)

Tier 4
Sustainability

Long-term consequences of therapy (e.g., care-induced illnesses)

Source: NEJM Dec 2010

• Achieved clinical status
• Achieved functional status

• Care-related pain/discomfort
• Complications
• Reintervention/readmission

• Long-term clinical status
• Long-term functional status
The Outcome Measures Hierarchy

Localized Prostate Cancer

1. **Survival**
   - Disease-specific survival

2. **Degree of recovery / health**
   - Anxiety and depression

3. **Time to recovery or return to normal activities**
   - Time to diagnosis
   - Time to treatment
   - Length of inpatient stay
   - Time to return to work

4. **Disutility of care or treatment process** (e.g., treatment-related discomfort, complications, adverse effects, diagnostic errors, treatment errors)
   - Bleeding
   - Thrombosis
   - Continence
   - Erectile function

5. **Sustainability of recovery or health over time**
   - Biochemical recurrence
   - Metastatic progression

6. **Long-term consequences of therapy** (e.g., care-induced illnesses)
   - Radiation-induced complications of intestine, bladder, bones, skin
Measuring Multiple Outcomes
Prostate Cancer Care in Germany

5 year disease specific survival

- Average hospital: 94%
- Best hospital: 95%

Source: ICHOM
Measuring Multiple Outcomes -- Continued
Prostate Cancer Care in Germany

- **Average hospital**
  - 5 year disease specific survival: 94%
  - Severe erectile dysfunction after one year: 75.5%
  - Incontinence after one year: 43.3%

- **Best hospital**
  - 5 year disease specific survival: 95%
  - Severe erectile dysfunction after one year: 34.7%
  - Incontinence after one year: 6.5%

**Source:** ICHOM
Variation in Quality Across German Providers:
In-hospital Cardiac Bypass Mortality for 77 hospitals (2008)

Mortality (%)

Median 3.2%

Each bar represents one hospital

Source: BQS Outcomes 2008 – see page 184 of Redefining German Health Care for graph on risk-adjusted results
# Comprehensive Measurement of Outcomes Varies Greatly by Condition

<table>
<thead>
<tr>
<th>Levels</th>
<th>Dimensions</th>
<th>Musculoskeletal</th>
<th>Cancer</th>
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<tbody>
<tr>
<td></td>
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<td>Hip Osteo-</td>
<td>Breast Cancer</td>
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<td>arthritis</td>
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<td>Chronic Low Back Pain</td>
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<tr>
<td>T1: Survival</td>
<td>Mortality</td>
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<td>3</td>
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<tr>
<td>T1: Degree of Health Achieved or Maintained</td>
<td>Achieved clinical status</td>
<td>5</td>
<td>1</td>
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<tr>
<td></td>
<td>Achieved functional status</td>
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<td>10</td>
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<tr>
<td>T2: Time to Recovery or Return to Normal Activities</td>
<td>Time to recovery</td>
<td>2</td>
<td>3</td>
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<tr>
<td>T2: Disutility of Care or Treatment Process</td>
<td>Complications</td>
<td>11</td>
<td>4</td>
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<tr>
<td></td>
<td>Reintervention/readmission</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>T3: Sustainability of Health or Recovery and Nature of Recurrences</td>
<td>Long-term clinical status</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Long-term functional status</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>T3: Long-term Consequences of Therapy</td>
<td>Long-term consequences of therapy</td>
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</tbody>
</table>

1. Dimensions are aspects of care that ICHOM believes registries should consider measuring to be comprehensive. 2. ICHOM name represents a common term to group measures across registries that are measuring essentially the same thing but with different terms. 3. International Consortium for Outcomes Measurement - ICHOM

Source: ICHOM Repository (10/16/2012); BCG analysis
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5. Standardize outcome measures to enable comparison and learning
Comparing Outcomes Across Institutions/Sites

In-vitro Fertilization Success Rates

Percent Live Births per Fresh, Non-Donor Embryo Transferred by Clinic Size
Women Under 38 Years of Age, 1997-2011

Comparing Outcomes across Centers


Number of programs: 219
Number of transplants: 19,588
One year graft survival: 79.6%

- 16 greater than predicted survival (7%)
- 20 worse than predicted survival (10%)
Comparing Outcomes across Centers

Adult Kidney Transplants, US Centers, 2008-2010

Number of programs included: 236
Number of transplants: 38,535
1-year graft survival: 93.55%

- 8 greater than expected graft survival (3.4%)
- 14 worse than expected graft survival (5.9%)
Agenda

• Principles of Outcome Measurement
• **Putting Outcomes Measurement into Practice**
Outcome Measurement And Improvement Process

Definition of Outcomes → Data Collection → Data Compilation and Analysis → Comparison and Improvement
Definition Of Outcomes

Working groups

• are led by an experienced clinician (not necessarily a physician) who has a deep knowledge of the medical condition and who is a true advocate for outcome measurement

• are supported a project leader from quality management department

• consist of dedicated people from different professional groups, across specialties, including outcome experts

• meet regularly to define and improve outcome measures, risk adjustment factors and validated instruments

• Involve patients and their perspective into their indicator sets

• Should meet and compare with peers on national and international level
Various Outcomes Are Measured Over Care Cycle
Example primary knee replacement process Schön Klinik

- Quality of life (EQ-5D)
- Functionality (WOMAC-score)

- Range of motion at least 0/0/90
- Limited ability to walk
- Limited ability to walk (actual vs expected)
- Vascular lesion (a/e)
- Nerve damage (a/e)
- Fracture (a/e)
- Postoperative wound infection (a/e)
- Hematoma, bleeding (a/e)
- Other complications
- Mortality (a/e)

- Functionality (Staffelstein-score, physician-reported)

- Quality of life (EQ-5D)
- Functionality (WOMAC-score)
- Functionality (Staffelstein-score, physician-reported)

- Quality of life (EQ-5D)
- Functionality (WOMAC-score)
- Functionality (Staffelstein-score, physician-reported)
Data Collection
Initial steps

• Collect **baseline data** on all outcome dimensions at the start of care
• Capture **available** outcome metrics from clinical/administrative systems
• Identify the **best placed individual(s)** for **entering data** and making on each measure
  - E.g. physicians, nurses, patients or dedicated measurement staff
• Create a processes to **enter measures efficiently**, ideally as part of standard workflow
• Survey patients to measure **patient-reported outcomes**
• Access **payor** information if available to capture care upstream
• Create an **auditing system** to eliminate errors, as well as to test the objectivity of qualitative scoring and judgments
Data Collection Process in Spine Care at Schön Klinik

- 7,000 Patients are treated per year in the Spine Clinic at Schön Klinik, with the majority still relying on paper and pencil for data collection.

- 1,000 Briefs are sent to patients post-treatment.

- 70-80% of patients are contacted within one month post-treatment.

Source: Schön Klinik Quality Report 2012
Collecting Outcome Data: Moving to a Real-time System

EMR Capture
• Modify the EMR to allow efficient collection of clinician-reported measures
  – E.g. standardized, medical-condition specific templates

Patient-Reported Outcomes
• Create tablet and web-based tools to gather patient-reported outcomes
  – E.g. Dartmouth Spine Center tablets, patient portals

Long Term Tracking
• Develop practical patient tracking methods to follow patients over extended time periods
  – Links to registries, payor and government databases (e.g., worker’s compensation, unemployment, death records)
Duke Oncology and Partners Make PROM Collection Simple by Integrating into Existing Workflow

While waiting, patient fills in survey on tablet (illustrative) with integrated instructions
+ e.g., Partners HealthCare has developed an instruction video, delivered on iPad, instead of the staff

Report printed or viewed on screen to quickly inform clinicians about the patient’s condition, to use in clinical setting
+ Patient can report information they are not comfortable to discuss

Integrate additional data needed such as "Review of Systems" and save data to health info system to reduce documentation time
+ Partners uses pdf of patients report attached to the EHR
+ Duke Oncology uses data export directly to their data warehouse

Minimize time spent by admin. staff during surveying
Reduce time upfront & focus the clinician’s interaction
Capture info. for existing documentation needs


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Compiling and Analyzing Outcome Data

• Compile outcomes data and initial conditions in a **centralized registry or database**
  – Data should be structured around patients and their **medical conditions**, not visits or episodes

• Report to **external disease registries** if available

• Create reports covering **risk-adjusted patient cohorts** over time

• Compare outcomes **across providers and locations**

• **Refine** the measures, collection methods, and risk-adjustment factors over time
Partners Healthcare Has Integrated PROM Reports Into Their Patient Portal And EHR Record For Real-time Use

Patient and doctor can both access report real-time

Report provides simple visual form with definition, indicator and trend

Physician access through EHR

Electronic Health Record

On-Site

iPad

Remote Patient Gateway

Patient Portal

Mail

Patient report access options
(~50% of Patients using Gateway)

Source: Interview with Partners HealthCare PROMs Program, Partners HealthCare HIT Policy Committee Clinical Documentation Hearing February 2013

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Begin with internal reporting to clinicians
  – Comparing outcomes of care teams or physicians over time, then across locations
  – Move from blinded to unblinded data at the individual provider level

Expand reporting over time to include referring providers, payers, and patients
  – An agreed upon path to external transparency of outcomes

Work with provider peers, payers, and government to standardize reporting measures and methods

Ultimately, universal reporting of standardized measures will be the strongest driver in value improvement
SART IVF Registry Houses A Database On Their Website, With Performance Of Each ART Clinic

Public data creates accountability for data accuracy and promotes action among physician groups.

Source: www.sart.org, Interview with Society of Assisted Reproductive Technologies (SART) Registry leaders and technology provider Redshift Technologies Inc.
STS Reports Data On Physician Groups Using A Report Card, With Composite Metric And Star Rating Rating:

Search CABG Data by Group

<table>
<thead>
<tr>
<th>Name</th>
<th>Overall Composite Score</th>
<th>Absence of Operative Mortality</th>
<th>Absence of Major Morbidity</th>
<th>Use of Internal Mammary Artery</th>
<th>Receipt of Required Perioperative Medications</th>
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<tbody>
<tr>
<td>Adamson and Dembisky Medical Corporation</td>
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<td>California Cardiovascular</td>
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<td>and Thoracic Surgeons</td>
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<td>Cardiac Surgeons at</td>
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Click for definition of the AVR Overall Composite Star Ratings:

"Surgical performance is measured based on a combination of the NQF-endorsed isolated AVR mortality measure and the same morbidity outcomes that make up the NQF-endorsed CABG morbidity measures.... Participants receive a score for each of the two domains, plus an overall composite score, which is calculated by “rolling up” the domain scores into a single number. In addition to receiving a numeric score, participants are assigned to a rating category designated by one to three stars."

STS provides patients with national, risk-adjusted benchmarks against which to gauge a provider’s results.

Note: Public reporting is voluntary since 2011. CABG = Coronary artery bypass grafting. Source: Society of Thoracic Surgeons website, interview with STS
Data Comparison and Improvement

• Convene **regular meetings** to analyze outcome variations and trends
  – Create an environment that allows **open discussion of results** with no repercussions for participants willing to learn and make constructive changes

• Utilize outcomes analysis to investigate **process improvement and potential care innovations**

• Collaborate with external registries and leading national and international providers to **benchmark performance and compare best practices**

• Combine outcome data with **care cycle costing** data to examine opportunities for value improvement through better efficiency, reducing redundancy, and eliminating activities that do not contribute to outcome improvement
Aravind Clinic Created A Internal Web Portal For Physicians To Review Their Outcomes

Web portal evolved from Excel-based reports, as physicians required more user-friendly tools

Source: Aravind Eye Care Hospitals Cataract Surgery Outcome Monitoring training document illustrative report view
Aravind Engages Full Team In Outcome Review
Regular Meetings Key To Achieving Culture Shift And Change

Weekly meetings convene clinicians to discuss process, quality and outcomes

Sample quality meeting agenda highlights importance of clinical engagement and action

I. Start meeting with previous weeks minutes – follow-up items
II. Review overall data – free and paid patients
III. Look at complications and outcomes
IV. Look at each cases risk factors and surgeon, technique, how was it managed (to protocol) in order to assess causes of variation
V. Brainstorm systems or ideas to prevent future complications and issues to track
VI. End of meeting – raise any other issues and provide summary of next steps

Source: Interview with Aravind Eye Care Hospitals India, Aravind website
ICHOM is a Nonprofit Dedicated to Accelerating Development and Impact of Outcomes Measurement

ICHOM's three founders with the desire to unlock the potential of VBHC...

...launched ICHOM as a nonprofit
+ Independent 501(c)3 organization
+ Idealistic and ambitious goals
+ Global focus
+ Engages diverse stakeholders

Our mission:
We are transforming health care by empowering clinicians worldwide to measure and compare their patients’ outcomes and to learn from each other how to improve.
ICHOM Runs Global Working Groups to Define Standard Sets of Outcomes

ICHOM facilitates a process with international physician and registry leaders and patient representatives to develop a global Standard Set of outcomes that really matter to patients.
ICHOM Standard Set for Localized Prostate Cancer

Treatment approaches covered

- Watchful waiting
- Active surveillance
- Prostatectomy
- External beam radiation therapy
- Brachytherapy
- Androgen Deprivation Treatment
- Other

© 2013 ICHOM. All rights reserved. When using this set of outcomes, or quoting therefrom, in any way, we solely require that you always make a reference to ICHOM as the source so that this organization can continue its work to define more standard outcome sets.
Data Collection Options:

**Patient-reported data**
**Definition:** Recommend using EPIC-26 domain responses and summary scores

**Response Options:** Use EPIC-26 (paper-based or IT)
**Inclusion/Exclusion Criteria:** Exclude: Patients who have initiated salvage treatment
**Timing:** Before treatment, 6 Months after treatment, and annually up to 10 years

**Data Collection Options:** Clinical or patient-reported data
**Definition:** Indicate whether patient experienced a CTCAE v. 4.0 grade III-V complication
**Response Options:** Yes/No; record maximal grade and domain
**Inclusion/Exclusion Criteria:** Include: patients who undergo radiation therapy
**Timing:** Within first 6 months following treatment
Standard Sets In Five Conditions Already Developed

Conditions targeted for 2014

- Stroke
- Hip and Knee Osteoarthritis
- Macular Degeneration
- Lung Cancer
- Parkinson’s Disease ✔
- Depression and Anxiety
- Cleft Lip and Palate
- ...

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ICHOM Standard Sets Will Cover 70% of the Disease Burden By 2017

- 4 conditions
- 12 conditions
- 24 conditions
- 40 conditions
- 50+ conditions

Share of disease burden in industrialized countries:

- 2013 (9%)
- 2014 (37%)
- 2015 (45%)
- 2016 (57%)
- 2017 (70%)
Once Set Is Defined, Supporting Materials Are Created To Raise Awareness And Support Adoption

**Flyer**
- Beautifully designed rendition of ICHOM Standard Set
- Promoted at conferences, Harvard health care courses, and on the ICHOM website

**Reference Guide**
- Full detail of Standard Set for institutions interested to start collecting or payors looking to integrate into reimbursement programs
- Includes definitions, inclusion and exclusion criteria, time points for data collection, and index events

**Academic Publication**
- Announces the Standard Set to the medical community
- Explains process to arrive at Standard and motivation for each outcome and risk factor selected
Implementing Outcomes Measurement is not Easy
ICHOM can assist you with 3 different levels of support

Download our "Reference Guides"
Clear and unambiguous definitions to implement our Standard Sets

Join the Implementation Network
Resources to help you get started
Community to connect with your peers and ask questions
Regular Webinars to share content and discuss your issues

Get on-site support
Our ICHOM team provides on-site support to select partners
- E.g. 4-weeks diagnostic, seminars,...

This is only offered to selected ICHOM Sponsors

Free on our website
$500 per Medical Condition (launch price)
Contact us
How to join us?
www.ICHOM.org
ICHOM Is A Fully Independent Non-profit Organization Financially Based On Charitable Donations

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